August 1976

Ecological survey of

South Fork Devils Canyon candidate Research Natural Area (NW Cone Peak region)

Monterey District, Los Padres National Forest

(Purchase Order 793-PSW-76)

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INTRODUCTION

Natural area potential

A concentration of important ecological values has long been recognized in the Cone Peak region. Stebbins and Taylor (1973) recently summarized these views for the National Park Service and concluded that "Cone Peak should be given highest priority for inclusion in the Registry of Natural Landmarks".

Within the Cone Peak region the south fork of Devils Canyon (Fig's 1-5) is a natural topographic and floristic unit with botanical features of outstanding natural area potential (Griffin 1974). The Devils Canyon vegetation includes:

extensive bristlecone fir groves,
impressive old-growth sugar pine stands,
interesting southern and northern montane "disjuncts",
"endemics" including three rare species, and
several types of mixed hardwood forest.

Since the Devils Canyon vegetation involves a combination of interesting plants in an unusual topographic setting, a natural area here will not duplicate any possible natural area beyond the Santa Lucia Range. Even within the Santa Lucias only partial duplication of the Devils Canyon situation can be achieved.

The natural area emphasis in the Devils Canyon area should not be on "typical" examples of widespread commercial timber types but rather on unique plant communities. Portions of the hardwood stands with only minor amounts of conifers can serve as examples of the widespread Coast Range mixed hardwood forest

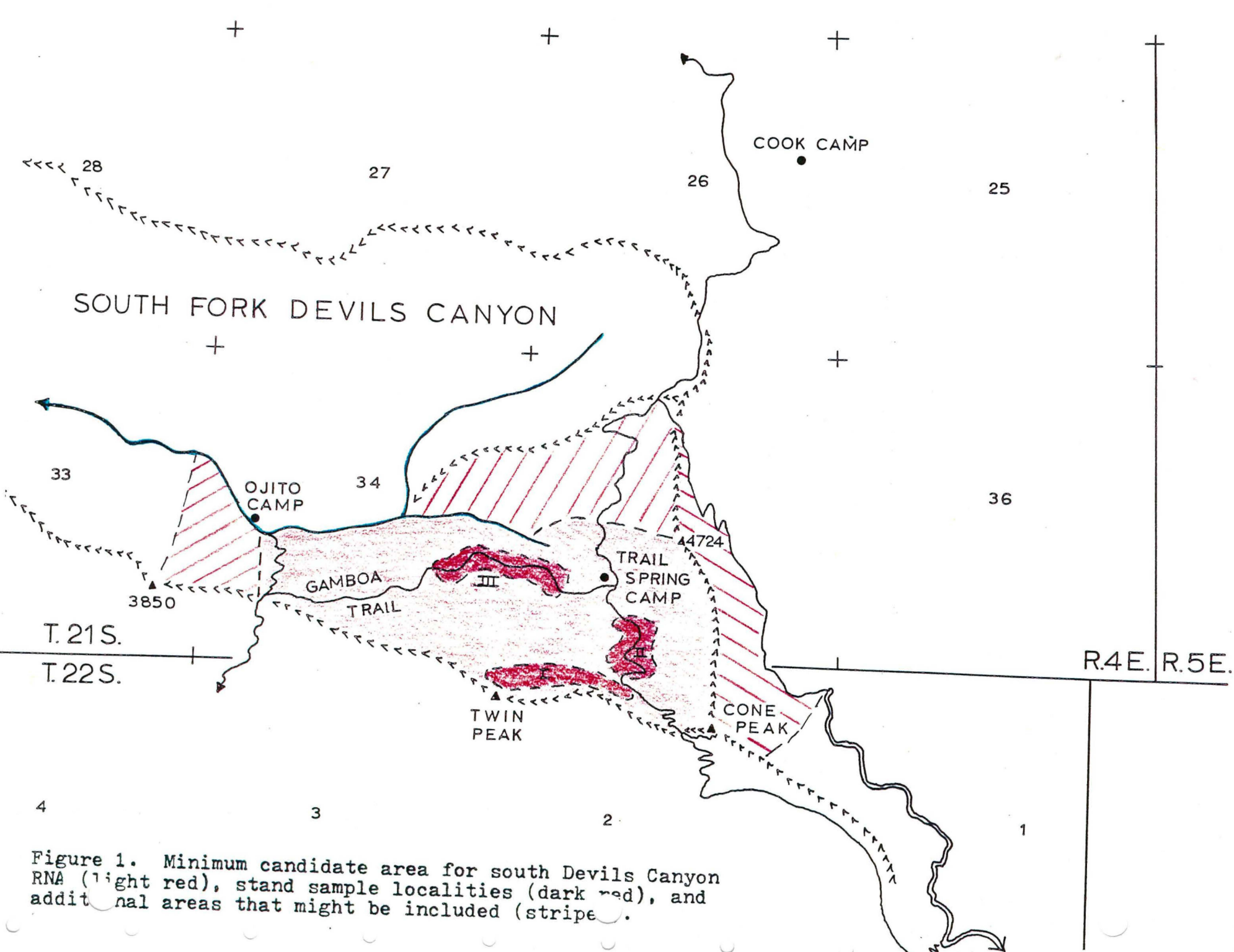

Figure 1. Minimum candidate area for south Devils Canyon RNA (light red), stand sample localities (dark red), and additional areas that might be included (stripe).

Figure 2. View up south fork of Devils Canyon to summit of Cone Peak, 6-2-76. Southern aspect on left covered with mixed hardwood forest, steeper slopes below the summit covered with fir-pine woodland--rock-land.

Figure 3. View down south fork of Devils Canyon showing pine/mixed hardwood forest, 6-23-72. The summer fog in the picture reaches 3,500 feet in elevation, higher than usual.

Figure 4. Northern slope of Twin Peak above Trail Spring, 6-2-76 showing the pine/oak woodland near ridge and pine/ mixed hardwood forest covering rest of slope.

Figure 5. Looking through the sugar pine canopy on Twin Peak at the open Quercus chrysolepis phase of mixed hardwood forest on the southern slope of south Devils Canyon, 5-8-76.

(SAF type 234 oak-madrone, and SAF type 239 canyon live oak). But it is inappropriate to view the Devils Canyon sugar pine stands as an example of the mixed conifer forest (SAF type 243 Ponderosa pine-sugar pine-fir). The endemic bristlecone fir stands are beyond question unique to the Santa Lucias, and some of the herbaceous communities in Devils Canyon can not be duplicated anywhere else. Parts of the sparse cover on rock patches on the summit of Cone Peak can be replicated on Ventana Double Cone in the Ventana Wilderness.

Historical background

Besides the inherent vegetational values there is a colorful botanical heritage associated with Cone Peak (Griffin 1975a). During the mid-1800's European botanists including David Douglas, Thomas Coulter, Theodor Hartweg, and William Lobb traveled to the Cone Peak region (Appendix I). It is likely that they all collected in or near the south fork of Devils Canyon where they were impressed with the large sugar pines and the picturesque firs. Although some specimens taken by these early collectors still exist in European herbaria, none of their field notes or personal journals have survived.

California botanists were first attracted to this region toward the turn of the century. By then a formal trail between the upper San Antonio River ranches and the Lucia coastal homesteads crossed Devils Canyon. Alice Eastwood passed this way in June 1893 and may have camped within the proposed natural area. Willis Jepson visited the area in June 1901. Many Cone Peak specimens collected by Jepson and his contemporaries are still

available, but these botanists gave us no detailed notes on the vegetation as they saw it.

Besides these botanists several ornithologists visited Cone Peak in the early 1900's. Jenkins (1906) spent several days on the headwaters of south Devils Canyon which he refered to then as Big Creek. He noted that on "Cone Peak and Twin Peak, sugar pines (Pinus lambertiana) were abundant and intermingled with these were a number of silver firs (Abies venusta)." Pemberton and Carriger (1915) also visited the Cone Peak region in 1909, and they took one photograph of the "pine and fir forests" which must have been in Devils Canyon. A significant observation by these ornithologists was the record of the disjunct population of mountain chickadees (Penthestes gambeli) in the sugar pine forest.

The first descriptive notes on the Cone Peak region with much vegetational merit were by Plummer and Gowsell (1905). While surveying timber, range, and watershed features of the proposed Monterey Forest Reserve, they mentioned vegetation conditions within each township. In Township 21 S, Range 4 E, in which they included all the Cone Peak sugar pine forest, they noted that "A good stand of timber, including Abies venusta covers the south eastern portion. There has been but little grazing." Plummer and Gowsell estimated that the Cone Peak forest contained about 11 million board-feet of sugar pine timber (with 9 million board-feet on Junipero Serra Peak).

A later report that also mentioned the vegetation of Devils Canyon was the first operating plan of the Monterey National

Forest (Sloane 1914). This report noted that sugar pine was restricted to the north slopes of Cone Peak and Junipero Serra Peak. Sloane stated that in the sugar pine forest "very little reproduction is present due partly to fires, but mostly to the squirrels. It is estimated at from 10 to 15 M ft. BM per acre." He reduced the estimated volume of sugar pine timber on Cone Peak to more realistic levels-- 6 million board-feet (and 2 million board-feet on Junipero Serra Peak).

After the Sloan report there was little activity on Cone Peak relating to vegetation description until the VTM survey completed mapping the Lucia and Junipero Serra Peak quads about 1932. The original VTM maps show the gross vegetation types reasonably well, but the summary notes (St John 1932) add little to the record. Unfortunately, the VTM survey took no photographs in south Devils Canyon. The 1941 blue-line version of the VTM type maps for the Lucia and Junipero Serra Peak quads are far less useful than the originals.

Although the early reports give some clues as to fire history on parts of the Monterey National Forest, they give no clear details about fires on Cone Peak. Routine records on fire areas were not available until 1911. The Los Padres National Forest maps derived from fire records after 1911 show no fires within the proposed natural area although there were several nearby.

Early maps of the Cone Peak region do not show the trails accurately. But the USGS Lucia quad which was surveyed in 1917 clearly shows the Gamboa trail crossing through the proposed

natural area in substantially the same location as the present trail (Fig. 1).

Ecological background

Climate. No long term weather records exist for Devils Canyon, and no standard weather station is so situated that direct comparison with this montane locality is useful. The only reasonable estimate of Cone Peak climate was made by Talley (1974). He measured precipitation at 14 bristlecone fir study plots during the dry 1971-72 season. Three plots were on Cone Peak: south Devils Canyon, summit, and east face. By comparison with standard weather station data that season Talley converted his single season record into a crude estimate of mean annual precipitation. He found that the highest precipitation occured on the lee slopes of high ridges within 4-5 miles of the coast. His data suggest that Devils Canyon may receive an average precipitation over 70 inches with the east face of Cone Peak receiving over 90 inches.

In some seasons much of this precipitation comes as snow. In 1970 Talley observed considerable snow breakage to bristlecone firs on the upper slopes of Cone Peak. Snow damage after the great snow storm of January 1974 (Morrison 1976) was severe on hardwoods below 3,400 feet in elevation in Devils Canyon e.g., near Ojito Camp. This storm may have broken up to 20% of the crown volume in such situations (Morrison 1976). But above 3,800 feet there was almost no damage to hardwoods or conifers.

There seem to be no records of unusual wind damage to the conifers on Cone Peak. No obvious "blow-down" patches were

observed here as in the Junipero Serra Peak sugar pine forest (Griffin 1975b).

Talley (1974) gathered some temperature data on Cone Peak, but his data are difficult to summarize briefly. He had hygrothermograph records for portions of 1970-1971 from the east face of Cone Peak. Between June 1972 and 1973 max.-min. thermometers were maintained at four localities on Cone Peak and read periodically.

The proposed natural area is above the main summer fog zone (Fig. 3) which often extends up to 3,000 feet. Talley (1974) discusses in detail the relation of Cone Peak to annual patterns of regional air temperature inversions.

Geology and soils. Although the topography is complex, rock structure in the south fork of Devils Canyon is relatively simple. The proposed natural area is all pre-Cretaceous metamorphics, mapped as Sur series crystalline schist with local outcrops of marble running across Twin Peak and Cone Peak (Reiche 1937). No faults are mapped within the candidate area. The geology is more complicated to the northwest near Cook Camp where upper Cretaceous marine sediments are encountered, and particularly to the south in the Limekiln Creek drainage where Franciscan sediments and significant faulting are involved (Jennings and Strand 1958).

The soils of the Devils Canyon region have recently been mapped (Soil Conservation Service 1975, sheets 46,47) but the mapping is so generalized that it is not helpful for describing the proposed natural area. Only three vague composite soil units

are shown within the candidate area:

rock outcrops-xerorthents

Cieneba-Sur-rock outcrops complex

Sur-Junipero complex.

From the formal soil series descriptions it appears that the most developed soils on north aspects supporting sugar pines approach Junipero sandy loam while poorly developed soils supporting open hardwood forests or scrub approach Cieneba fine gravelly sandy loam.

Fauna. Cone Peak seems to have a fairly rich avifauna as far as south Coast Range peaks are concerned, but no detailed studies have been made here. I noticed no published references to Cone Peak birds aside from the notes in Jenkins (1906) and Pemberton and Carriger (1915). They reported the mountain chickadee which has been found in the Santa Lucias only in the sugar pine stands of Cone Peak and Junipero Serra Peak. The present status of the chickadees at Cone Peak is not clear. The uncommon flammulated owl (Otus flammeolus) has been seen there in recent years.

Although not a "typical" habitat, south Devils Canyon does support a large population of acorn woodpeckers (Melanerpes formicivorus). The old-growth sugar pines provide excellent acorn storage and nest building sites-- and also furnish high perches from which the woodpeckers can dive for insects.

I have little knowlege of the herpetofauna, but rattlesnakes (Crotalus viridis) were encountered twice during field work in Devils Canyon in June 1976. The uncommon California mountain

kingsnake (Lampropeltis zonata) was seen on the summit of Cone Peak at dusk in June 1976.

Survey methods

Starting in June 1972 I made periodic visits to Devils Canyon to check the flora, and the vascular plant list (Appendix II) is now relatively complete. The most intensive sampling was done on the upper slope of Twin Peak (Fig. 4), the least intensive below the Gamboa trail.

On June 15-16 and August 6, 1976 twelve vegetation plots were established in each of three localities within the most significant sugar pine communities (Fig. 1). Plots were so arranged that they contained at least one sugar pine. Insufficient time was available to adequately sample the hardwood communities lacking sugar pines. Since Talley (1974) made such a detailed study of bristlecone fir, including seven 700 m^2 plots on Cone Peak, the fir communities were not sampled.

My vegetation study was based on circular plots (Table 1), the size depending upon stand density. Distances from the center marking pole were checked with an optical rangefinder (with 10" baseline). Total cover was estimated for all trees (>1" dbh), shrubs (<1" dbh but>50 cm tall), and herbs (<50 cm tall). Diameters were measured for all large trees and estimated for most small trees. In sprout clumps dbh was taken for each stem rising from ground level. Cover-abundance values were assigned all species in the shrub and herb strata (Mueller-Dumbois and Ellenberg 1974).

TABLE 1. General topographic situation of three sample localities, south Devils Canyon

Locality & plot size	Ave. elev. (ft.)	Ave. aspect (°)	Ave. slope (%)
I. Twin Peak 12 500 m^2 plots	4,550	010	72
II. Trail Spring trail 12 300 m^2 plots	4,150	002	61
III. Gamboa trail 12 250 m^2 plots	3,700	028	65

TABLE 2. Estimated cover (%) of each stratum at three sample localities, south Devils Canyon

Locality	Stratum		
	Tree	Shrub	Herb
I. T.P.	45	07	02
II. T.S.t.	73	20	19
III. G.t.	80	17	10

VEGETATION TYPES

At higher elevations in the Big Creek-Devils Canyon drainage where there is moderate soil development the vegetation is basically a mixed hardwood forest (Talley 1974, St John 1932). Mixed hardwood forest as used here refers to the south Coast Range version of the Mixed Evergreen Forest in which Douglas-fir is absent (Sawyer, Thornburgh, and Griffin 1976). Near Cone Peak both "Lithocarpus-Arbutus-Quercus" and "Quercus chrysolepis-Pinus coulteri" phases of this forest are present. But the nature of the mixed hardwood forest is complicated in south Devils Canyon by the old-growth sugar pines locally towering above the hardwood canopy.

On steep terrain without significant soil development the forest is broken up into a woodland with individuals and groups of hardwoods and conifers scattered within a mosaic of cliffs, rock outcrops, and talus slides. Bristlecone firs are conspicuous on these open rockland communities (Talley 1974), and the herbaceous cover contains many disjunct and endemic species (Griffin 1975a).

No real chaparral or grassland communities occur within the candidate area.

Pine/ oak woodland

(Pinus lambertiana-P. coulteri / Quercus chrysolepis woodland)

Between the ridgecrest and 4,400 feet on the north slope of Twin Peak the mixed hardwood understory is poorly developed (Fig. 6). The sugar pines are so widely spaced that "forest" is inappropriate and "woodland" may be a more precise term

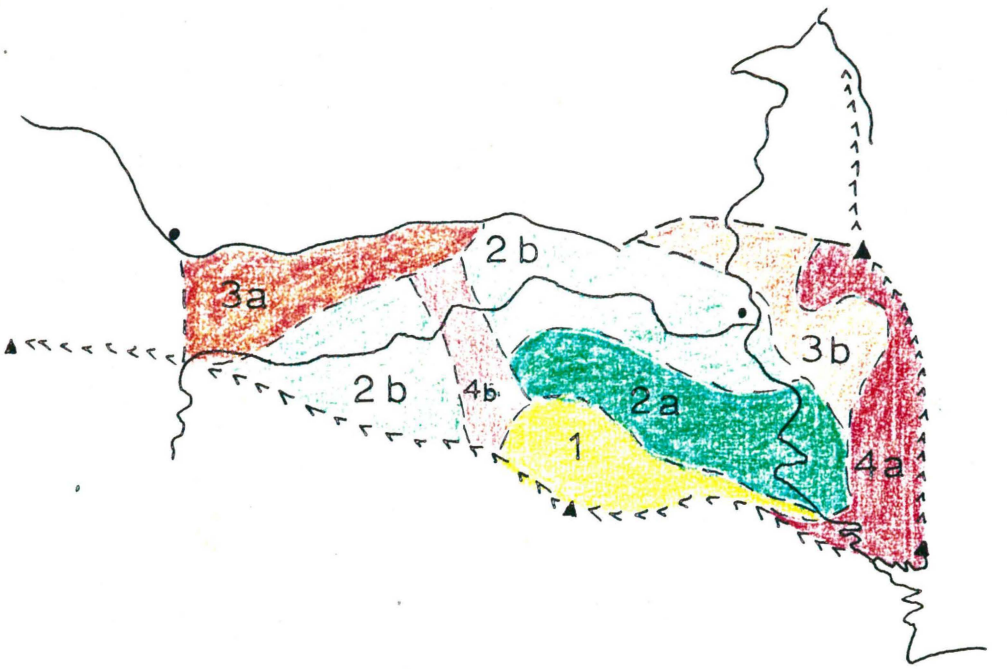

Figure 6. Type map of the south Devils Canyon RNA candidate area. Rough estimates of acerage in major vegetation types, most boundaries are very gradual in the field. Type boundaries generalized from field observations, areas taken by planimeter.

	Vegetation types	Acres
1	Pine/ oak woodland	51
	Pine/ mixed hardwood forest	
2a	P.lambertiana/ Lithocarpus- Q. chrysolepis/ Rhus	92
2b	P. lambertiana/ Litho.-Q. chrysolepis-Arbutus/Rhus	168
	Mixed hardwood forest	
3a	Lithocarpus- Q. chrysolepis- Arbutus/ Rhus	66
3b	Q. chrysolepis	51
	Fir-pine-oak woodland -- rock-land	
4a	Summit woodland	65
4b	Tranisition-Ravine woodland, many additional groves too small to map	27
		524

(Mueller-Dumbois and Ellenberg 1974). Tree cover on the Locality I plots here (Fig. 1) was about 45% (Table 2), and the tree crowns seldom meet.

The mixed hardwood forest is represented by canyon live oak trees and shrubs; tanoaks and laurels are rare, and madrone is absent. Although the oaks are rather short, some trees on the rockier spots have not suffered serious fire damage for a long time. They have larger trunks, and greater basal area, than the more numerous younger sprout-clump stems lower on the slope (Table 3).

The dominant conifers are widely spaced old-growth sugar pines ranging up to 58 inches dbh (Fig's 7-8). Coulter pines are scattered; only one old-growth tree was on the plots. Heights of the sugar pines probably average 100 feet; seven old-growth trees measured ranged from 90-125 feet. Sixty percent of the old-growth sugar pines on the plots had obvious old basal fire scars. A few trees had been struck by lightning but had not burned.

The minor shrub stratum in this woodland is mainly composed of tree saplings, and the herb stratum also has many tree seedlings (Table 4). All the real herbs have low cover-abundance values (Table 4). The herb with highest frequency was Galium californicum, probably some form of ssp. flaccidum (Dempster and Stebbins 1968). The closely related "rare" (Powell 1974) and "threatened" (Smithsonian Inst. 1974) ssp. luciense was in the area but not on the plots. The "rare" and "threatened" Galium clementis (Fig. 9) was also scattered about. The "rare"

TABLE 3. Density and basal area of species in the tree stratum in three sample localities, south Devils Canyon

Locality	Species							
	Pinu. la.	Pinu. co.	Quer. ch.	Lith. de.	Abie. br.	Arbu. me.	Umbe. ca.	all species
	Ave. # trees / acre							
I. T.P.	24	19	55	16	1			115
II. T.S.t.	49	1	85	163	2			300
III. G.t.	24		165	214	3	51	22	479
	Ave. basal area ft^2 / acre							
I. T.P.	117	7	20	2	+			146
II. T.S.t.	281		8	32	+			321
III. G.t.	204		32	42	+	15	+	293

Figure 7. Old-growth sugar pine on 80% slope in pine/oak woodland in Locality I, 6-16-76.

Figure 8. Old-growth sugar pines in pine/oak woodland near summit of Twin Peak, 5-8-76.

TABLE 4. Frequency (%) of all species in tree, shrub, and herb strata for each locality / modal cover-abundance values of all species in shrub and herb strata for each locality, south Devils Canyon

	Locality								
	I. T.P.			II. T.S.t.			III. G.t.		
Species	T	S	H	T	S	H	T	S	H
Pinus la.	100	67/1	75/1	100	92/1	50/1	100	08/R	08/+
Lithocarpus de.	17	33/1	08/+	92	100/2	83/+	100	92/2	58/+
Quercus ch.	83	100/1	83/+	83	92/2	50/1	92	92/2	75/1
Abies br.	08	08/+	08/+	17	17/+		08	33/2	08/1
Rhus di.			08/R		33/1	100/2		42/+	92/2
Umbellularia ca.		08/R				08/R	17	17/1	08/R
Polystichum cu.			58/+			08/R			25/+
Pinus co.	83	42/+	08/+	08					
Galium ca.			75/+			42/+			
Lupinus ce.			58/+			17/1			
Carex mu.			08/R			08/R			
Asclepias ca.			17/+						
Arenaria do.			25/+						
Monardella vi.			08/R						
Lonicera in.		08/+							
Elymus gl.			08/R						
Lathyrus ve.			08/1						
Solidago ca.			08/1						
Quercus wi.					17/R				
Arbutus me.					08/+		67		
Acer ma.						08/R			
Ceanothus ol.					08/R				
Hieracium al.						33/1			
Carex gl.									25/+
Heteromeles ar.								08/+	

Figure 9. A mat of the "rare" and "threatened" Galium clementis on a rock outcrop in the fir-pine woodland--rock-land on Cone Peak, 5-8-76.

Figure 10. The "rare" and "threatened" Lupinus cervinus along the Gamboa trail, 6-2-76. This species is most conspicuous in openings in the pine/oak woodland, Locality I.

and "threatened" Lupinus cervinus (Fig. 10) was conspicuous in parts of the area, and this lupine is probably as common in the woodland openings on Twin Peak as anywhere within its restricted distribution.

In appearance the Twin Peak pine / oak woodland closely resembles the P. lambertiana-P. coulteri / Q. chrysolepis community on Junipero Serra Peak (Griffin 1975b). Coulter pine is less important on Twin Peak, but structurally and floristically the two communities are close.

Small portions of the sugar pine community on the east slope of the main Cone Peak ridge could also be classed as pine / oak woodland.

Pine / mixed hardwood forest (P. lambertiana / Lithocarpus- Q. chrysolepis / Rhus phase)

Near Locality II the hardwood understory rapidly increases in density (Fig. 11). Tree cover rises to 73% (Table 2) and can easily be called forest. The change in tanoak is dramatic, increasing over ten-fold in number of stems and basal area (Table 3). Madrone is rare in the stand, but no trees were picked up on any plots at Locality II. Almost all of the hardwood trees are sprouts; there are no old-growth canyon live oaks as in the woodland above. The maximum dbh of the canyon live oak sprouts was 8 inches, of tanoak 12 inches. Hardwood regeneration was abundant under the sprout canopy; all plots had yound shrubby tanoaks (Table 4).

The sugar pine overstory probably reaches its maximum development near Locality II. Heights of the sugar pines are significantly

Figure 11. Pine / mixed hardwood forest at Locality II with dense understory of tanoak saplings, 6-16-76.

taller than in the pine / oak woodland. Five trees measured at Locality II averaged 149 feet tall. The maximum sugar pine dbh measured in Devils Canyon (70 inches) was at Locality II. Long ago these old trees sustained considerable fire damage--86% of the old-growth pines have obvious fire scars. Sugar pine tree density and basal area are significantly greater at Locality II than in the pine woodland above or the denser hardwood forest below (Table 3). Where large sugar pines have fallen and left local openings in the forest, sugar pine regeneration is abundant (Fig's 12-13), but little pines are well scattered throughout the forest (Table 4).

Poison-oak is a conspicuous addition to the ground cover of the pine / mixed hardwood forest. In the herb stratum poison-oak has a cover up to 25% on all plots, and it reaches into the shrub layer in one-third of the plots (Table 4).

Scattered plants of Allium burlewii grow in and near a talus slide that cuts through the Locality II forest (Fig. 14). This is the only known locality for this disjunct onion in the Santa Lucias (Griffin 1975a).

In the open forest near the Locality II talus slide a few plants of Cycladenia humilis venusta (Fig. 15) are scattered along with Lupinus cervinus. This is one of three spots in south Devils Canyon where I have found this rare disjunct. The only other known place this plant grows in the Santa Lucias is under the sugar pine forest on the summit of Junipero Serra Peak (Griffin 1975b).

Figure 12. Pinus lambertiana seedlings and saplings in opening in pine / mixed hardwood forest, Locality II, 6-16-76.

Figure 13. Pinus lambertiana saplings in opening in pine / mixed hardwood forest, Locality II, 6-16-76. Lupinus cervinus is scattered between the saplings.

Figure 14. Talus slide in Locality II, 5-8-76; habitat for *Allium burlewii*.

Figure 15. *Cycladenia humilis* in bloom on talus patch crossing the Coast Ridge trail at head of south Devils Canyon, 6-5-76.

A few plants of the interesting montane forest disjunct Chimaphila menziesii grom in Locality II. A few plants of this species also appear in the pine/ oak woodland on the east face of Cone Peak.

(P. lambertiana / Lithocarpus- Q. chrysolepis- Arbutus / Rhus phase)

Below Locality II the hardwood understory continues to increase in cover (Table 2) and density (Table 3). Tanoak trees are present on all plots; canyon live oaks are locally absent; madrones are locally common; laurel is a minor part of the cover on some rocky spots (Table 4). Sizes of hardwood sprouts are similar to those at Locality II, but on a rocky spur a 30-inch dbh old-growth canyon live oak was present. Maximum dbh for tanoak and madrone sprouts was 14 inches.

Sugar pines in the overstory tend to be smaller in diameter than in Locality II, and the maximum dbh was 61 inches. Bark characters and crown form suggest some of these sugar pines may be in younger age-classes than the pines at Localities I and II. Only 29% of the old-growth pines had basal fire scars. Although heights were not measured in Locality III, the pines appeared to be shorter than those in Locality II. Sugar pine density in Locality III was about the same as in the woodland plots. Basal area was intermediate between Locality I and II (Table 3). A few pole-sized sugar pines were scattered about in the forest, but sugar pine seedlings and saplings were rare at Locality III (Table 4).

The herbaceous flora was poorly developed. The few herbs shown in Table 4 were mostly in rocky openings. Aside from

hardwood seedlings the only widespread plant in the herb stratum was poison-oak (Table 4). Although Galium californicum ssp. luciense, Galium clementis, and Lupinus cervinus are present, this lower elevation forest seems to be a marginal habitat for these endemics.

The most important new species found during this survey was Pleuricospora fimbriolata which had not previously been known south of the Santa Cruz Mountains in the Coast Ranges. Two individuals of this uncommon saprophyte were found along the Gamboa trail in Locality III.

Mixed hardwood forest

(Lithocarpus- Quercus- Arbutus / Rhus phase)

Between Locality III and Ojito camp the overstory sugar pines become so infrequent that the type can be refered to simply as mixed hardwood forest (Fig. 6). Talley (1974) noted that in this area individuals or small groups of old-growth sugar pines grew within a dense tanoak forest.

Although I have no quantitative data on stand composition, my impression is that tanoak remains the most important hardwood in the mixture with canyon live oak and madrone locally dominant. Interior live oak may be scattered, but it is more important at elevations below the candidate area closer to the redwood stands (Talley 1974). A few Coulter and Ponderosa pines are present. Poison-oak continues to be important in the ground cover.

This community probably differs little from some of the mixed hardwood forests in the Limekiln Creek drainage.

(*Quercus chrysolepis* phase)

On southerly aspects east of Trail Spring the diversity of the mixed hardwood forest drops, and canyon live oak becomes the dominant hardwood with only scattered sugar pines or Coulter pines rising above the closed canopy. Canyon live oak may form pure stands here several acres in extent. Near Trail Spring many of the canyon live oaks are medium sized trees with a few old-growth trees more than 3-feet in dbh. On the upper slopes the trees are small-- often just dense thickets of sprouts. In such situations it is difficult to judge the true size potential of the oaks because of the severe fire history.

These canyon live oak stands are part of an important forest type in the south Coast Ranges (Sawyer, Thornburgh, and Griffin 1976). Talley (1974) refered to such *Quercus chrysolepis* communities as the most extensive form of mixed hardwood forest in the Santa Lucias.

Fir- pine- oak woodland-- rock-land

Talley (1974) grouped bristlecone fir communities into three landscape classes:

Summit slow growing firs widely spaced among scrubby hardwoods on rocky slopes and ridges of the highest peaks (Fig's 16-17)

average slope 96%

tree & shrub cover less than 25%

(examples, plots 98-104, Cone Peak)

Transition below the summits on steep, rocky slopes not characterized by cliffs or sudden breaks in slope (Fig. 18)

Figure 16. Fir-pine-oak woodland-- rock-land at head of south Devils Canyon seen through the tanoak understory near Locality II, 5-8-76. This would be a "summit" type of Abies bracteata community in Talley (1974).

Figure 17. Fir-pine-oak woodland -- rock-land near the summit of Cone Peak, 6-16-76.

Figure 18. Fir- pine- oak woodland on a rocky slope within the Pine/ mixed hardwood forest near Locality III, 6-2-76. This would be a "transition" type of Abies bracteata community in Talley (1974).

average slope 84%

tree cover 40%, shrub cover 25%

(example, plot 34 north aspect, south Devils Canyon)

Ravine. rocky, concave lower slopes within the mixed hardwood forest region

average slope 70%

tree cover greater than 50%

(example, plot 35 west aspect, south Devils Canyon)

All three classes are represented in the candidate area with a large selection of outstanding "summit" examples. Details of stand composition are available in Talley's thesis and his original field notes.

In the "summit" woodland scrubby sugar pines and Coulter pines are scattered along with the firs. The hardwood are largely represented by stunted canyon live oaks. Some manzanita colonies are present but no real chaparral cover.

All three of my samplings localities are close enough to "transition" and "ravine" fir communities that young firs have seeded into my plots (Tables 3-4). But no old-growth firs were present on my plots, and most firs will be eliminated from such sites by any future fire. As Talley (1974) clearly documented, the stable fir communities have landscape features that almost preclude serious ground fires.

There are no major floristic differences between Talley's transition and ravine plots in Devils Canyon and my "non-fir" plots except for the mature firs.

The cliff-outcrop-talus rock-land mosaic between the conifers

id oaks in the "summit" woodland has a rich flora including healthy populations of:

Arabis breweri
Cheilanthes gracillima
Cheilanthes intertexta
Erigeron petrophilus
Eriogonum satatile
Galium californicum ssp. luciense
Galium clementis
Holodiscus microphyllus
Lotus argophyllus var. fremontii
Penstemon corymbosus
Stipa coronata
Streptanthus tortuosus

This rock-land flora is far better developed on the Cone Peak summit than in the rocky openings in the pine woodland or mixed forest portions of the candidate area.

The only other region in the Santa Lucias approaching this diversity of rock-land species is Ventana Double Cone. The Cone Peak summit has by far the major distribution of the "rare" and "threatened" Galium clementis, and only a few questionable specimens of the "rare" and "threatened" Galium californicum ssp. luciense have been collected away from Cone Peak.

RECOMMENDATIONS

In my opinion the south Devils Canyon area has as high a concentration of botanical values as any portion of the Los Padres National Forest and should receive highest priority for protection as a Research Natural Area.

The 542 acre candidate area (Fig's 1,6) is a minimum area that

includes reasonable examples of the rock-land herbs, bristlecone fir woodland, sugar pine woodland, and sugar pine/mixed hardwood forest. Topographically this is a natural unit between the east-west Twin Peak ridge, the north-south Cone Peak ridge, and the south fork of Devils Canyon creek.

The exact western boundary is difficult to set-- my suggestion is a line due north from the saddle where Ojito trail meets the Gamboa trail (4E11). If the west boundary were moved to a more recognizable natural feature e.g., the ridge running north from peak "3850" (Fig. 1), additional forms of mixed hardwood forest would be included. If this RNA is to include an example of SAF type 234 oak-madrone, the most appropriate area for it is near Ojito camp, and the westward extension might permit a better selection of oak-madrone vegetation. There may be some duplication between the vegetation in this westward extension and parts of the Limekiln Creek candidate area.

The northern boundary above Trail Spring is also difficult to set. My suggestion is to run it down the ridgeline from peak "4724" (Fig. 1) joining the south fork of Devils Canyon creek near the west side of section 35. If a more conspicuous natural boundary is needed, it could run down the major ridge from the summit of the Gamboa trail, thus including all the drainage of the southern fork of south Devils Canyon. If this RNA is to include an example of SAF type 239 canyon live oak, the most appropriate areas are north and east of Trail Spring. A northern extension would increase the selection of canyon live oak vegetation. The extension would also add small examples

of grassland, chaparral, and ponderosa pine forest-- these communities would be better represented in the Limekiln Creek candidate area.

If the east boundary were moved to include the east face of Cone Peak down to the Coast Ridge trail (3E10), more spectacularly steep topography with avalanche chutes would be included. This would add different summit fir-pine woodland examples and some additional pine/oak woodland. This extension would also add furthern protected habitat to all of the "rare" and "threatened" species on Cone Peak and most of the interesting disjuncts. The east face of Cone Peak could not be duplicated in any other RNA.

Ecologically it would be extremely desirable to include a sample of the sugar pine forest near Cook camp. This forest on sandstone is slightly different than those on the metamorphic schist at Devils Canyon. But administratively it is probably undesirable or impossible to enlarge the candidate are to include Cook camp or to have a small isolated unit a mile away from the main RNA. However, any serious study of the Cone Peak sugar pine communities should include Cook camp examples as well as south Devils Canyon.

The only administrative conflicts with the establishment of a south Devils Canyon RNA involve the status of the two lightly used camps, Ojito and Trail Springs. Any up-grading of these camps would be undesirable. The present use level does not pose any real problem for the candidate area.

Whether the south Devils Canyon area is joined with the Limekilm Creek area into one large RNA or is established separately is an administrative matter. They can stand alone.

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APPENDIX I

Historical notes on early Cone Peak plant collectors

DAVID DOUGLAS, Scottish botanist collecting for the London Horticultural Society, discovered bristlecone fir near Cone Peak in March 1831.

> "... Oct. 23, 1832 ... I will now mention another new Pinus to you (P. venusta), which I discovered last March, on the high mountains of California ..."
> (Hooker 1836)

Douglas' discovery of bristlecone fir was not published as P. venusta until Dec. 1836-- after D. Don had published on Coulter's fir collection from the same area as P. bracteata. (Little 1953).

Douglas discovered sugar pine in Oregon in 1826, but the first botanical account of sugar pine in California was when Douglas collected it near Cone Peak.

> "I saw for a second time, and in a new habitat, Pinus Lambertiana, more southerly on the mountains of Santa Lucia, in Upper California ... The timber in this new situation is the largest of all, but by no means so fine as that in the 43°, and 45° of N latitude, where the temperature is doubtless more congenial to it ..."
> (Hooker 1836)

Douglas may well have collected Coulter pine at the same time as he collected the fir and sugar pine.

THOMAS COULTER, Irish botanist, collected bristlecone fir and Coulter pine near Cone Peak in 1832. Lemmon (1888) and Jepson (1910) imply that Coulter collected in the Santa Lucias in 1831, but I can find no evidence to this effect. Coulter arrived in Monterey, probably by ship, in Nov. 1831. He started south through the Santa Lucias in Feb. 1832 and returned north through the Santa Lucias in July 1832.

> "The rainy season of 1832 ended late in February, which is rather after the usual time, and I started so soon as the country was passable... From Monterey southward the road runs through a series of narrow ravines..." (Coville 1895)

Coulter's Cone Peak collections were described by D. Don before July 1836 and become the type specimens (Little 1953).

Pinus coulteri

> "Discovered by Dr. Coulter on the mountains of Santa Lucia, near the Mission of San Antonio, in latitude 36°, within sight of the sea and at an elevation of from 3000 to 4000 feet above its level. It was growing intermingled with Pinus Lambertiana." (Don 1837)

> "The tree was discovered by Dr. Coulter, in what year is not stated..." (Louden 1838)

Abies bracteata

> "This curious and interesting species of Fir was discovered by Dr. Coulter on the sea side of the mountain range of Santa Lucia about 1000 feet lower down than Coulteri." (Don 1837)

Coulter probably discovered Penstemon corymbosus at the same time that he collected the conifers on Cone Peak.

THEODOR HARTWEG, a German botanist collecting for the London Horticultural Society, visited the Cone Peak region in 1847 hoping to collect seed from the sugar pine and bristlecone fir stands that Douglas and Coulter had mentioned.

> "On September the 20th I again left Monterey for the southern parts... From San Antonio a range of mountains extends along the coast, attaining a great elevation, which, although apparently barren as seen from the mission, I was assured on the western flank towards the sea is covered by large Pines... Having ascended the first ridge, we passed through thickets of Arctostaphylos tomentosa and Ceanothus thrysiflorus, and entered a forest of Pinus Lambertiana... Descending the western flank of the great mountain range, I found at last the long-wished-for Abies bracteata, occupying exclusively ravines... Having cut down some trees, I found to my regret that the cones were but half-grown, and had been frost-bitten. (Hartweg 1848)

WILLIAM LOBB, an English botanist collecting for William Veitch, gathered seed of bristlecone fir about 1852 (Ewan 1973). Lobb probably visited Cone Peak, but there is no direct evidence that his fir collection came from the Douglas-Coulter-Hartweg fir collecting area. Lobb discovered Lupinus cervinus in 1850 (Ewan 1973); this fact increases the probability that he

collected on Cone Peak.

> "[Bristlecone fir] is among the most remarkable of all the true Pines... Dr. Coulter first discovered it on the Andes of Santa Lucia... Doulgas met it ... in lat. 36° N. These botanists both failed to bring home perfect seeds, and it was left for William Lobb, Messrs. Veitch' indefatigable American collector to suceed in this." (Hooker 1853)

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APPENDIX II

Vascular plants, South Fork Devils Canyon RNA candidate area
(from observations over a five-year period)

Species	local comments
Abies bracteata	Santa Lucia Range endemic, type locality Cone Peak
Acer macrophyllum	
Allium burlewii	disjunct, rare on talus, only known population in Santa Lucia Range
Arabis breweri	rock outcrops
Aralia californica	riparian Devils Canyon
Arbutus menziesii	
Arceuthobium occidentale	parasitic on Pinus coulteri
Arctostaphylos glandulosa	
Arctostaphylos ?	some manzanitas near Cone Peak summit appear to lack burls, hence cannot be typical *A. glandulosa*, they resemble var. howellii forms of *A. glandulosa*, also resemble what the VTM survey called *A. canescens*
Arctostaphylos hooveri	Santa Lucia Range endemic
Arenaria douglasii	
Asclepias californica var. *greenei*	
Brodiaea pulchella	
Bromus diandrus	introduced, minor weed grassy summit of Twin Peak
Bromus grandis	
Bromus tectorum var. *tectorum*	introduced, minor trail-side weed
Calochortus albus var. *rubellus*	
Carex globosa	

Carex multicaulis	disjunct
Castilleja martinii	
Ceanothus oliganthus	
Cheilanthes gracillima	rare on rock outcrops Cone Peak summit, near south limit in Coast Ranges
Cheilanthes intertexta	rock outcrops, there might be some of the closely related C. covillei, but all plants examined in area appeared to be C. intertexta
Chimaphila menziesii	disjunct, rare in area, Cone Peak and Ventata Double Cone are only populations in the south Coast Ranges
Chrysopsis villosa	
Chrysothamnus nauseosus ssp. albicaulis	disjunct, rare in area, rare in Santa Lucia Range
Cirsium californicum	
Clarkia (rhomboidea?)	
Collinsia childii	
Collomia heterophylla	
Cordylanthus rigidus	
Cuscuta (californica ?)	
Cycladenia humilis var. venusta	disjunct, rare in area, Cone Peak and Junipero Serra Peak only populations in south Coast Ranges
Cystopteris fragilis	
Delphinium nudicaule	
Disporum hookeri	
Elumus glaucus	
Epilobium minutum	
Erigeron petrophilus	rock outcrops
Eriodictyon californicum	
Eriogonum fasciculatum	

Eriogonum gracile	
Eriogonum saxatile	rock outcrops
Eriophyllum confertiflorum	
Erysimum capitatum	
Festuca elmeri	
Galium aparine	introduced, unimportant in forest understory
Galium angustifolium	
Galium californicum ssp. flaccidum	
Galium californicum ssp. luciense	Santa Lucia Range endemic, type locality Cone Peak, virtually all plants of the ssp. are on Cone Peak, Calif. Native Plant Soc. rare plant (Powell 1974)
Galium clementis	Santa Lucia Range endemic, rare in Santa Lucias, best populations on Cone Peak, Calif. Native Plant Soc. rare plant (Powell 1974)
Garrya flavescens var. pallida	
Habenaria elegans	
Heteromeles arbutifolia	
Hieracium albiflorum	
Hieracium argutum var. parishii	
Holodiscus microphyllus	disjunct, Cone Peak and Ventana Double Cone are the only populations in the south Coast Ranges
Lathyrus vestitus	
Linanthus androsaceus	
Lithocarpus densiflorus	
Lithophragma heterophylla	
Lonicera hispidula	

Lonicera interrupta	
Lotus argophyllus var. fremontii	disjunct
Lotus strigosus	
Lupinus abramsii	Santa Lucia Range endemic
Lupinus cervinus	Santa Lucia Range endemic, type locality probably Cone Peak, Calif. Native Plant Soc. rare plant (Powell 1974)
Madia maidioides	
Melica harfordii	
Melica imperfecta	
Mimulus bifidus ssp. fasciculatus	
Mimulus subsecundus	
Monardella villosa	
Montia perfoliata	
Nemophila parviflora	
Pellaea mucronata	
Penstemon breviflorus	
Penstemon centranthifolius	
Penstemon corymbosus	type locality probably Cone Peak, near southern end of range
Phacelia douglasii	
Phacelia egena	
Phacelia malvaefolia	
Phoradendron villosum	parasitic on Quercus chrysolepis
Pinus coulteri	
Pinus lambertiana	disjunct, Cone Peak and Junipero Serra peak only populations in the south Coast Ranges

Pityrogramma triangularis	
Poa scabrella	
Polypodium californicum	
Polystichum curtum	(ssp. curtum to be described as species)
Pleuricospora fimbriolata	new species record for Monterey Co., range extension south from the Santa Cruz Mountains
Quercus chrysolepis	
Quercus wislizenii	
Rhamnus californica	
Rhamnus crocea ssp. ilicifolia	
Rhus diversiloba	
Sambucus mexicana	
Sanicula crassicaulis	
Selaginella bigelovii	
Sitanion jubatum	
Solidago californica	
Streptanthus tortuosus	disjunct, rare in Samta Lucias, Cone Peak, Ventana Double Cone, and one spot in San Luis Obispo County
Stipa coronata	rock outcrops
Trifolium tridentatum	
Umbellularia californica	
Vulpia myuros	introduced, rare weed in trails
Yucca whipplea	
Zauschneria californica	